



mSOLVE BUILDING SCIENCE SOLUTIONS

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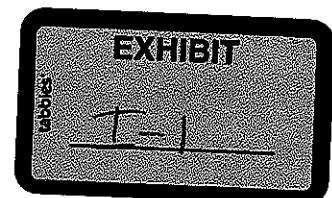
## Francis Conlin, PE, CMR

### mSolve, Building Science Solutions

Francis Conlin, Professional Engineer, Certified Mold Remediator, has a background in both environmental and mechanical engineering and has particular expertise in residential building performance. Mr. Conlin has provided engineering support, project management, research, training and marketing services both locally and nationally for the building and building science industries specializing in air movement and moisture dynamics. His work history includes serving as a project coordinator for a National Housing Research Alliance where he managed numerous projects concerning building performance. Mr. Conlin has expertise in conducting multi-point, real time monitoring of environmental conditions and energy use in homes, conducting evaluations of residential indoor air quality and ventilation strategies, field testing and analysis of air distribution system performance, and builder training. Other activities include projects with low-income and affordable housing, residential energy consumption modeling including HERS analysis, residential and commercial building performance, diagnostics and training.

#### PROFESSIONAL EXPERIENCE HIGHLIGHTS

- Conducts moisture and mold diagnostic and consulting work for local and national housing corporations.
- Conducts building performance diagnostic and consulting work for local and national housing corporations.
- Serves as a third party moisture control inspector to insurance companies for multifamily and other buildings applying for comprehensive moisture damage insurance.
- Provides insurance evaluations for large condominium projects to assess their risk of future moisture problems.
- Developed and taught continuing education courses approved by the NC Department of Insurance on Moisture, Mold and Energy Management.
- Served as program coordinator for the Manufactured Housing Research Alliance. Managed projects on moisture control, duct leakage, vapor barriers, ventilation, and the Energy Star Program for Factory Built Homes.
- Developed research and protocols for the measurement of soot production from candles and carbon deposition on interior surfaces. (proprietary)
- Coordinated a manual of air distribution system design and construction practices for the factory built housing industry for the National Manufactured Housing Alliance.
- Designed and executed a laboratory investigation to determine whole house ventilation options for factory built housing. Testing was conducted for the Manufactured Housing Institute and approved by the Director of the Office of Consumer and Regulatory Affairs of HUD.
- Served as a Senior Project Engineer for the Applied Building Science Center of the North Carolina Advanced Energy Corporation. Responsible for projects in building sciences, diagnostics and training, computerized energy use analyses for factory built and site-built housing. Managed all aspects of projects: concept development, proposal writing and budgeting, presentation to Board of Directors, field work, hiring and supervision of contractors, and report writing.





- Instructor for the Advanced Energy Corporation at the Duct School and at the Heat Pump Skills Center. Trained HVAC technicians in installation, construction and diagnostic techniques related to heat pumps, insulation, ventilation, air distribution system construction and design.
- Conducted on-site diagnostic surveys of residential and commercial buildings, including ventilation studies, heating and cooling plant analysis, whole building and duct leakage quantification, infrared imaging, and building system assessment.

#### **2003-Present**

Senior Engineer at mSOLVE Building Science Solutions, a division of Kestrel Management Services, a Madison, WI firm providing residential and commercial builders and building owners with prevention strategies, consulting and hands-on solutions to deter moisture-related problems in buildings, including mold growth. mSolve employs the principles of quality management, best practices, training, and risk management tools to help builders and building owners prevent mold in the built environment by learning how to control moisture and moisture-related problems.

#### **1998- 2003**

Independent consultant: ComfortWorks Engineering, provided building systems inspections, energy performance evaluation, moisture investigations, energy consumption studies, indoor air quality assessments, heating and cooling systems evaluation and building science measurement, training and research.

#### **1996-98**

Senior Associate with The Levy Partnership, Inc., a New York City based consulting firm providing engineering, architectural, research, training, management, and marketing services in the housing industry.

#### **1984-96**

Senior Project Engineer for the Applied Building Science Center of the North Carolina Advanced Energy Corporation (AEC – formerly the Alternative Energy Corporation). Responsible for projects in building sciences, diagnostics and training, curriculum development and training, residential heat pumps, computer analysis, factory built housing, commercial buildings, thermal energy storage, and industrial processes. Managed all aspects of projects: concept development, proposal writing and budgeting, field support, hiring and supervision of contractors, and report writing. AEC is a private non-profit corporation responsible to the North Carolina Utilities Commission, and charged with minimizing the future cost of electricity.

#### **1982-84**

Graduate Researcher for the University of Tennessee Energy, Environment and Resources Center. Provided field support, data collection and computer analysis of residential ground-coupled heat pump systems.

#### **1980-82**

Staff Engineer for Environmental Planning Engineers, Inc., Knoxville TN. Assessed probable hydrological consequences due to coal mining, collected field data collected and conducted computer analysis. Developed and operated computer simulation models to make hydrological quality and quantity assessments.

#### **1978-80**

President of Amity Construction Company Inc., Knoxville, TN. Provided construction management for residential and small commercial construction and renovation.



## EDUCATION

Master of Science in Mechanical Engineering, University of Tennessee, Knoxville Tennessee, 1984. Primary academic areas: Heat Transfer and Fluid Dynamics. Conducted research on ground coupled heat pumps, including field installation, computer modeling and analysis.

Bachelor of Science in Engineering Science and Mechanics - Environmental Option, University of Tennessee, Knoxville Tennessee, 1980. Primary Academic areas: Environmental Engineering and Fluid Dynamics. Academic Honors: Phi Eta Sigma 1976, Tau Beta Pi 1977, Phi Kappa Phi 1979, Golden Key Honor Society 1980.

## AFFILIATIONS

- Certified Professional Engineer North Carolina Registration No. 14859
- Certified Professional Engineer Alabama Registration No. 28155
- Certified Mold Remediator – IAQA. CMR 03362
- Energy Efficient Builders Association.
- Member, American Society of Heating, Refrigeration, and Air Conditioning Engineers. Past chairperson for the Energy and Technical Affairs Committee for the Triangle Chapter.
- HERS Rater certified for BOPs and REM Rate analysis as stipulated in the Residential Energy Services Network RESNET guidelines.

## CONTINUING EDUCATION

- ASHRAE 2005 Winter Meeting Short Course on "Preventing Moisture and Mold Problems, Design and construction Guidelines", and "Designing Residential Ventilation Systems for 62.2"
- Certified Mold Remediator Training, certified by Indoor Air Quality Association, July 2003.
- HERS Rater Training certification, 2002
- Commercial HVAC Systems Design and Analysis, North Carolina State University, 1998
- Third Annual Conference on Building Commissioning, by Portland Energy Conservation Inc., May 1995.
- Intermediate training in Windows, Word, Excel, and MS Project Manager Software 1993.
- Project Management Program for Engineers, The University of Tennessee Management Development Center December 1989.
- Level 1 Heat Pump Analysis 1988, Alabama Power Company.
- Energy Conservation in HVAC 1988, Industrial Extension Program, North Carolina State University, Raleigh, NC. Cogeneration Industry Update 1987, Government Industries, Washington DC.
- Effective Applications of Packaged Cogeneration Systems 1987, Government Industries, Washington DC.
- Project Management - Industrial Extension Program, North Carolina State University, Raleigh, NC.
- Solar Energy Short Course sponsored by Midwest Research Institute and the Solar Energy Research Institute.

## PUBLICATIONS

- Manufactured Housing Moisture Dynamics, Chapter 22 of the Manual for Moisture Control in Buildings, Second Edition, American Society of Testing and Materials (ASTM), Edited by Heinz R. Trechsel (To be published 2006).
- "Conserving Energy and Managing Moisture in Manufactured Homes"; a continuing Education Course for NC installers and retailers in NC.
- *Minimizing Moisture Problems In Manufactured Homes: Understanding Their Causes and Finding Solutions. Excellence in Design, Manufactured Housing Installation Series*, for the Manufactured Housing Research Alliance, October, 2000.



- *Manufactured Housing Duct Systems: Guide to Best Practices. Excellence in Design, Manufactured Housing Installation Series*, for the Manufactured Housing Research Alliance, June, 2000.
- Manufactured Housing Heat Pump Demonstration Program for the Electric Power Research Institute, 1998.
- Measured airflow capacity through engineered orifices: *Comparative testing of passive ventilators in manufactured homes*, The Levy Partnership, March 1997.
- "Heat Pumps and Manufactured Homes: Making the Marriage Work," *Home Energy Magazine*, November 1996.
- *Air of Importance – A Study of Air Distribution Systems in Manufactured Homes*, NC Alternative Energy Corporation, May 1996.
- *An Analysis of Air Distribution System Losses in Contemporary HUD-Code Manufactured Homes*, Proceedings of the American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings, 1996.
- *Field Investigation of Thinking Cap Controlled Passive Ventilation System*, Alternative Energy Corporation February 1994.
- *Residential Air-Conditioning Field Performance Status and Future Priorities*, Proceedings of the American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings, 1988.
- *Thermal Energy Storage for a Convenience Store Refrigerator*, North Carolina Alternative Energy Corporation, 1987.
- *Options for Reducing Energy Use in Manufactured Housing*, Proceedings of the American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings, 1986.
- "Simulation of a Horizontal Coil Ground Coupled Heat Pump," *Journal of Solar Engineering*, August 1986.

## PROJECT LIST

### Residential

#### Various

Conducted moisture and mold assessments for a variety of clients including: Regional Waterproofing, Forensic Engineers, Inc. Advanced Energy, Marshall Miller & Associates, Future Homes, Hank Hoomani Progressive Design Collaborative, Capsys Builders, Inspire Pharmaceuticals, Weather Master, Cam Hill Builders, Trophy Homes, Healthy Homes, Inc, Champion Enterprises, R-Anell Custom Homes, Carolina Building Solutions, Crestline Homes, Fleetwood Enterprises, All American Homes, Carteret General Hospital, Four County EMC, Blue Sky Homes, Chadwick Town Homes Owners Association, Clayton Homes, Skyline Homes, and Palm Harbor Homes.

#### The Levy Partnership, Inc.

- EPRI Heat Pump Demonstration Project. This large technical and marketing development effort was geared to establish heat pumps as the primary space conditioning choice for the manufactured housing industry in the Southeast.
- Designed and executed a laboratory investigation to determine whole house ventilation options for factory built housing for the Director of the Office of Consumer and Regulatory Affairs of HUD.
- Provided technical support and training to support the effort of Palm Harbor Homes to be the first manufactured housing builder of the EPA ENERGY STAR homes in the U.S.

#### Manufactured Housing Research Alliance

- Provided technical support and training to support 15 manufactured home manufacturers to become certified to build Energy Star homes.



- Field Study of Moisture Problems in 70 Gulf Coast Manufactured Homes.
- Field Study of Indoor Air Pollution Effects by Supplemental Fuel Heaters in Manufactured Housing.
- Research and production of a manual of efficient duct design and construction practices for the factory built housing industry.
- Research and production of a manual of efficient duct design and construction practices for the factory built housing industry.
- Provided technical support and training to support the effort of Palm Harbor Homes to be the first manufactured housing builder of the EPA Energy Star homes in the U.S.
- Industry consulting on steel framing applications, equipment sizing, moisture problems and structural insulated panels.

#### Advanced Energy Corporation

- Conducted mold and moisture investigations for low-income Native American housing in, Cherokee NC.
- Conducted various moisture and mold investigation in occupied residences – includes Anderson, Bernhard and Air-O-Cell tests and protocols.
- Developed a research protocol for the measurement of soot production from candles and carbon deposition on interior surfaces of buildings.
- Conducted on-site diagnostic surveys of residential, commercial and factory-built buildings, including ventilation studies, heating and cooling plant analysis, computer analysis, whole building and duct leakage quantification, infrared imaging, and building system assessment for the Applied Building Science Center of the North Carolina Advanced Energy Corporation,
- Trained HVAC technicians in installation, construction and diagnostic techniques related to heat pumps, insulation, ventilation, duct construction and design at the Heat Pump Skills Center of the Applied Building Science Center of the North Carolina Advanced Energy Corporation.
- Surveyed over 40 new homes for the CP&L/Xenergy survey. Presented observations in interim review. Conducted several public workshops to discuss the results. Coordinated powered attic ventilator study. Performed load calculations.
- Assembled database and wrote report for a variety of field studies of existing manufactured homes. Conducted pressure testing and repairs of newly sited homes. Developed a protocol for rapid duct pressure test procedure.

#### Kestrel Management Services

- Conducted mold and moisture investigations for modular homes. Represented builders in legal proceedings as an expert witness.
- Evaluated residential buildings in Ohio, Tennessee and West Virginia for problems related to mold growth. Reported cause and remedy and made recommendations for repair following the New York City Department of Health Mold Remediation Protocol.



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**Expert Witness Disclosures Required by Rule 26(a)(2)(B)**

**Francis Conlin, PE NC, PE AL**

Senior Engineer, mSolve, Building Science Solutions; a Division of Kestrel Management Services  
Madison, WI

**Expert Witness Testimony / Depositions:**

- 2002 – Mr. & Mrs. James Krantz. vs. All American Homes of Rutherfordton NC in Rutherfordton County Superior Court. October 2002
- 2006 – Southern Piping Company v. Hartford Fire Insurance Co., U.S. District Court, Eastern District, Western Division Case No.: 5:06-CV-00099-BO
- 2006 – Sarah A. Gibby vs. Southern Energy Homes, Inc. Cedar Ridge Home Center, Inc. now known as Homes of Thomasville, Inc. and 21<sup>st</sup> Mortgage Corporation, et. al., American Arbitration Association Case No. 30 181 0142 05
- 2006 – Robert and Sandra Powell, Plaintiffs vs. Fleetwood Enterprises Inc., AAA Mobile Home Sales, Inc. and Carl Goss d/b/a Goss Manufactured Homes Service, Defendants. 21<sup>st</sup> Judicial District Court for the Parish of Tangipahoa, State of Louisiana, Division “B” Case No. 2002-004382
- 2007 - Sheila M. Sharp v. River Birch Homes, Inc., et al., AAA Case No: 30 181 00650 06, for Ritchey & Simpson, Morgan Drive, Suite 100, Birmingham, Alabama 35216-3084. July 23&24, 2007. Linden Alabama County Court House.
- 2007 - Steven Whitaker v. Fleetwood Enterprises, Inc. and Fleetwood Homes of Georgia, Inc., AAA Case No. 30-434-01029-06, for Jim Crosby and David F. Walker of Crosby Saad, L.L.C., Mobile, AL 36685, September 25-27, 2007, Held at the Alabama Bar Association Offices, Mobile, Alabama.
- 2007 - Stanley and Sheila Byrd v. Southern Energy Homes, Inc., AAA Case No. 30 181 00810 06, and Charles and Dinah Daugherty v. Southern Energy Homes, Inc., AAA Case No. 30 181 00809 07, for W. Scott Simpson, Ritchey & Simpson, PLLC, Birmingham, Alabama 35216, Held at the offices of Beasley, Allen, Crow, Methvin, Portis & Miles, P.C, Montgomery, Alabama, October 1-4, 2007.
- 2007 – James Payne v. Fleetwood Enterprises, Inc. and Fleetwood Homes of Georgia, Inc., AAA Case No. 30-434-0069306 for Jim Crosby and David F. Walker of Crosby Saad, L.L.C., Mobile, AL 36685 October 25&26 and December 18&19, 2007, Held in multiple sites in, Mobile, Alabama.
- 2007 – Daniel and Kimberly Herron vs. Palm Harbor Homes, Circuit Court Houston Co, AL #CV 2006-241 ., and Kenneth Moore vs. Palm Harbor Homes Circuit Court Barbour Co, AL # CV 2006-98, for Winston W. Edwards, Craddock Davis & Krause, LLP, Montgomery, Alabama 36106-2802, Held in Montgomery, Alabama, December 11-14, 2007.

Mr. Conlin has also provided expert testimony through additional depositions including.  
Terry Deese v. Champion Home Builders Co., et al. Case No.:1:06-CV-643 MHT, on November 1, 2007, and  
Nick and Jennifer Strickland vs. Champion Homes Case No.:1:06-CV -00682/DRB, on November 30, 2007,

These additional depositions involve the offices of Beasley, Allen, Crow, Methvin, Portis & Miles, of Montgomery, AL as the Plaintiff representative: and Ritchey & Simpson, PLLC, of Birmingham, AL as the defense representative.

**Publications:**

- Manufactured Housing Moisture Dynamics, Chapter 22 of the Manual for Moisture Control in Buildings, Second Edition, American Society of Testing and Materials (ASTM), Edited by Heinz R. Trechsel (Publication continues to be delayed, now scheduled to be published in 2007).
- "Conserving Energy and Managing Moisture in Manufactured Homes," a continuing Education Course for NC installers and retailers in NC.
- *Minimizing Moisture Problems In Manufactured Homes: Understanding Their Causes and Finding Solutions. Excellence in Design, Manufactured Housing Installation Series*, for the Manufactured Housing Research Alliance, October, 2000.
- *Manufactured Housing Duct Systems: Guide to Best Practices. Excellence in Design, Manufactured Housing Installation Series*, for the Manufactured Housing Research Alliance, June, 2000.
- Manufactured Housing Heat Pump Demonstration Program for the Electric Power Research Institute, 1998.
- Measured airflow capacity through engineered orifices: *Comparative testing of passive ventilators in manufactured homes*, The Levy Partnership, March 1997.
- "Heat Pumps and Manufactured Homes: Making the Marriage Work," *Home Energy Magazine*, November 1996.
- *Air of Importance – A Study of Air Distribution Systems in Manufactured Homes*, NC Alternative Energy Corporation, May 1996.
- *An Analysis of Air Distribution System Losses in Contemporary HUD-Code Manufactured Homes*, Proceedings of the American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings, 1996.
- *Field Investigation of Thinking Cap Controlled Passive Ventilation System*, Alternative Energy Corporation February 1994.
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- *Thermal Energy Storage for a Convenience Store Refrigerator*, North Carolina Alternative Energy Corporation, 1987.
- *Options for Reducing Energy Use in Manufactured Housing*, Proceedings of the American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings, 1986.
- "Simulation of a Horizontal Coil Ground Coupled Heat Pump," *Journal of Solar Engineering*, August 1986.

**Compensation:**

As of Dec 31, 2007, Mr. Conlin is a salaried employee of Kestrel Management Services.  
Mr. Conlin salary and bonuses for all work activities from January - December 2007 was \$99,000.

Kestrel Management Services applies the following rates:  
\$150.00 per hour for inspections, research and consulting  
\$250.00 per hour for court appearances and depositions

Revision Date: December 2007  
Some items are subject to verification.